CLAIMS

What is claimed is:

1. A releasable clamp for securing a smaller tubular member having inner and outer walls and of a first outer diameter within a larger tubular member having a central axis and inner and outer walls of second, larger internal diameter, the clamp comprising:

a. a peripheral member mounted on the larger tubular member;

b. a clamping device in communication with the peripheral member for generating forces within the reaches of the peripheral member for reducing the inner diameter of the larger tubular member for engaging and securing the smaller tubular member and for releasing said forces for disengaging the smaller tubular member.

2. The clamp of claim 1, wherein the peripheral member is mounted on and peripherally surrounds the outer wall of the larger tubular member.

3. The clamp of claim 1, wherein the peripheral member is mounted on the exterior of the larger tubular member.

4. The clamp of claim 1, wherein the clamping device is non-invasive.

5. The clamp of claim 3, wherein the peripheral member defines a closed chamber surrounding the larger tubular member and wherein the clamping device comprises a hydraulic fluid which is introduced into the chamber with sufficient pressure to compress the inner diameter of the larger tubular member.

6. The clamp of claim 3, wherein the peripheral member defines a closed chamber surrounding the larger tubular member and wherein the clamping device comprises a material

introduced into the chamber in an uncured state and upon curing, expands to compress the inner diameter of the larger tubular member.

7. The clamp of claim 6, wherein the material is a curable liquid that expands as it cures.

8. The clamp of claim 7, wherein the material is an aggregate concrete.

9. The clamp of claim 5, including a seal for sealing the chamber.

10. The clamp of claim 4, wherein the clamping device comprises a heating element embedded within the peripheral member, whereby the application of heat to the heating element farther operates to expand the larger tubular member and whereby removal of heat caused the larger tubular member to compress for reducing the inner diameter thereof:

11. The clamp of claim l, wherein:

a. The peripheral member comprises an annular sleeve having an inner surface for peripherally surrounding and engaging the outer wall of the larger tubular member and having an external surface which is conically tapered relative to the axis; and

b. the clamping device comprises an annular ring having an internal tapered surface, the annular ring adapted to be positioned in axial alignment with the sleeve and in peripheral relationship therewith, whereby axial movement of the ring relative to the sleeve results in the application of a radial compression force on the sleeve for forcibly distorting the sleeve into the outer wall of the larger member, forcing the inner wall of the larger member radially inward for providing a gripping force for clamping and securing the member of smaller diameter.

12. The clamp of claim 11, wherein said sleeve includes a collar at one axial end thereof, said collar having the external tapered surface.

13. The clamp of claim 11, further including an axial tightening system for moving the ring axially relative to the sleeve.

14. The clamp of claim 11, including a device for holding the sleeve in axial position relative to the ring.

15. The clamp of claim 14, wherein the device comprises a spacer ring.

16. The clamp of claim 14, wherein the sleeve includes a cylindrical, externally threaded portion and wherein the spacer ring includes internal threads mated with the threaded sleeve portion.

17. The clamp of claim 15, wherein the spacer ring is removable.

18. The clamp of claim 11, wherein the smaller tubular member is casing hanger for supporting a casing in a well.

19. The clamp of claim 11, wherein the annular ring is adapted for axial movement relative to the sleeve.

20. The clamp of claim 13, further including an hydraulically extendable annular ram associated with the annular ring for moving the ring relative to the sleeve.

21. The clamp of claim 20, the ram further comprising a seal between the sleeve and the annular ring.

22. The clamp of claim 11, wherein the axis of the clamping arrangement is vertical.

23. The clamp of claim 11, further including radially extending bolts extending through threaded bores in the annular ring and directed axially toward the sleeve.

24. The clamp of claim 23, each said bolts having an end comprising a tapered dog, and recesses around the larger member, the recesses having inclined flanks and being positioned so that when the bolts are advanced into the recesses, the dogs first make contact with the inclined flanks and thereafter draw the annular ring inward towards the sleeve.

25. The clamp of claim 11, wherein the internal bore of the larger diameter member has a constant internal diameter.

26. The clamp of claim 11, wherein the sleeve is located between the larger diameter member and the annular ring.

27. The clamp of claim 11, wherein the annular ring is stress relieved to reduce hoop stresses.

28. The clamp of claim 27, wherein the stress relieving mechanism is a plurality of angularly spaced slots in the ring.

29. The clamp of claim 28, including slots in the inner wall of the ring.

30. The clamp of claim 29, including slots in the outer wall of the ring.

31. The clamp of claim 1, wherein the peripheral member and the clamping device are selectively movable along the axis of the larger tubular member.

32. The clamp of claim 31, further including a holding device for securing the peripheral member and clamping device in the selected position.

33. The clamp of claim 1, further including a mechanical locking device positioned within the larger tubular member for positively engaging and locking the smaller tubular member in position.

34. The clamp of claim 11, wherein the larger tubular member includes a radially extending portion for supporting the sleeve and wherein the annular ring is positioned above the radially extending portion and in peripheral surrounding engagement with the sleeve.

35. The clamp of claim 34, the radially extending portion including a threaded bore and the annular ring including a clearance bore in axial alignment with the threaded bore, the clamp further including a threaded mounting bolt passing through the clearance bore and having a head adapted for engaging the annular ring, whereby advancement of the bolt into the bore moves the annular ring relative to the sleeve.

36. The clamp of claim 1, further including a seal between the inner smaller tubular member and the outer larger tubular member.

37. The clamp of claim 1, including a strain gage on the interior wall of the smaller tubular member.

38. The clamp of claim 1, further comprising a plurality of clamp assemblies positioned in axially spaced relationship along the outer periphery of the larger tubular member.

39. The clamp of claim 1, further comprising a plurality of rings axially spaced and mounted on the periphery of the larger tubular member.

40. A method for clamping a smaller tubular member within a larger tubular member, the method comprising the steps of:

a. placing the smaller tubular member within the larger tubular member;

b. exerting a radially inward force on the exterior of the larger tubular member such that the larger tubular member flexes inward slightly to clamp the smaller tubular member;

c. releasing the radially inward forces so that the larger tubular member releases the smaller tubular member.

41. The method of claim 40 wherein the radially inward force is applied by communicating hydraulic fluid into a chamber formed between the larger tubular member and a peripheral member mounted on the larger tubular member.

42. The method of claim 40 wherein the radially inward force is applied by heating a peripheral member on the exterior of the larger tubular member.

43. The method of claim 40 wherein the radially inward force is applied by communicating a curable fluid into a chamber formed between the larger tubular member and a peripheral member mounted on the larger tubular member.

44. The method of claim 40 wherein the radially inward force is applied by moving a tapered clamping device relative to tapered peripheral member attached to the larger tubular member.

45. The method of claim 44 wherein the clamping device is moved by activating a hydraulically extendable annular ram.

46. The method of claim 44 wherein the clamping device is moved by rotating threaded fasteners associated with the clamping device.

47. The method of claim 40 wherein a peripheral member is first moved to a desired location along the larger tubular member, and then used to apply the radially inward force.